Weather Display™

User Manual

Columbia Weather Systems

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User Manual

Version 4.06

All specifications subject to change without notice.

Printed in U. S. A.

Weather Display User Manual

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Welcome

Welcome to the Columbia Weather Systems family of users and congratulations on your purchase of the Weather Display console.

The Weather Display is a precision instrument that requires proper installation and handling.

Please read this manual completely prior to installation.

Shipping Damage

BEFORE YOU READ ANY FURTHER, please inspect all system components for obvious damage. The Weather Display is a sensitive electronic instrument and can be damaged by rough handling. Your unit was packaged to minimize the possibility of damage in transit. Therefore, we recommend that you save the shipping container for any future shipment of your Weather Display.

NOTE: DO NOT RETURN THE INSTRUMENT TO COLUMBIA WEATHER SYSTEMS until the following steps are completed. Failure to follow this request will jeopardize your claim.

1. Open the container and inspect the contents. Do not throw away the container or any damaged parts. Try to keep items in the same condition as originally received.
2. Notify the transport company immediately in writing, preferably by facsimile, about the shipping damage.
3. Wait for the transport company's representative to inspect the shipment personally.
4. After inspection, request permission from Columbia Weather Systems for return of the damaged instrument by calling (503) 629-0887.
5. Return approved items to us at the following address:

   Columbia Weather Systems, Inc.

   5285 NE Elam Young Parkway, Suite C100

   Hillsboro, OR 97124
6. After return authorization is issued and we receive the instrument, an estimate of the cost of repair will be sent to you for submission to the transport company as a claim.

SECTION 1: Introduction

The Weather Display is available for all weather stations from Columbia Weather System to display and monitor weather data in real time.

The Weather Display features a color graphic TFT-LCD (800 x 480 pixels) monitor with a touch screen interface. The display is powered by a 200MHz ARM9 CPU.

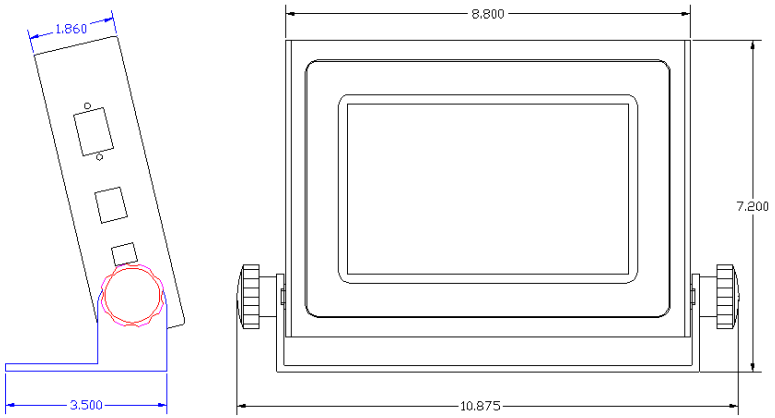
Features and Capabilities

- Displays date and time.
- Displays the values of all sensors from any Columbia Weather Systems weather station, depending on the factory set software configuration.
- Calculates wind chill, dew point, heat index, density altitude and rain rate.
- Displays the rain for the day, the week, the month, and the year.
- Displays wind averages and gusts.
- Displays min/max values and time for all parameters for the current day.
- Displays a daily trend graph for all the parameters.
- Displays weather data in Metric or English units.
- Displays weather data from any Weather MicroServer on the local network.
- Triggers an alarm to sound when a selected parameter value has been surpassed.

The display unit incorporates a Backlight button that turns off the LCD screen backlight. The backlight is turned back on by touching any part of the screen.

SECTION 2: Physical Description

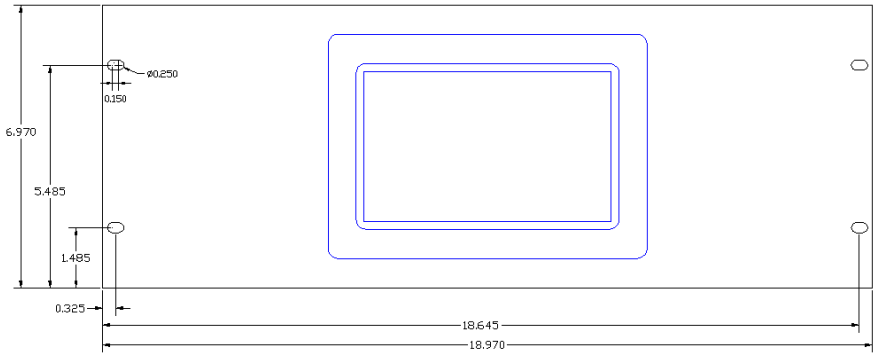
Desktop Chassis

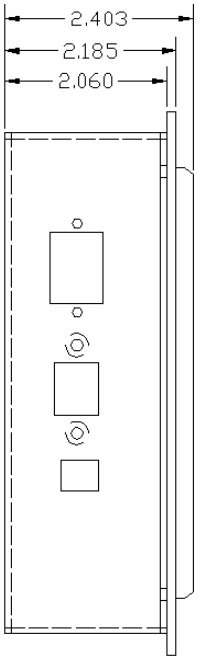


The Weather Display desktop chassis configuration includes the following:

1. Weather Display chassis and base
2. Wall-mount power supply
3. RS-232 cable to the weather station for Serial Interface Models
4. Ethernet cable for Ethernet Interface Models
5. User manual

19” Rack Mount Chassis

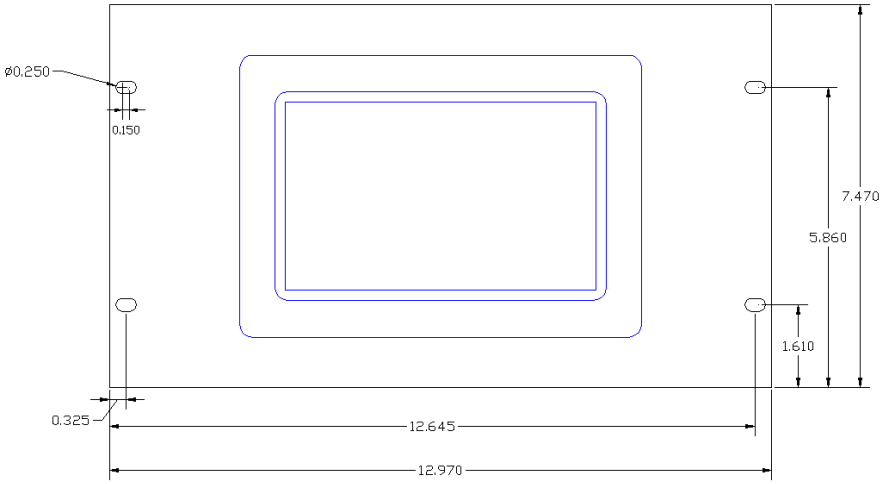


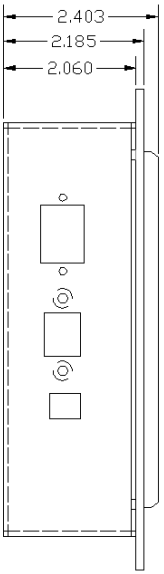


The Weather Display in the 19" rack mount configuration comes with the following:

1. Weather Display mounted on a 4U 19" rack mount panel
2. Wall-mount power supply
3. RS-232 cable to the Control Module
4. User manual

Panel Mount Chassis





The Weather Display in the panel mount configuration comes with the following:

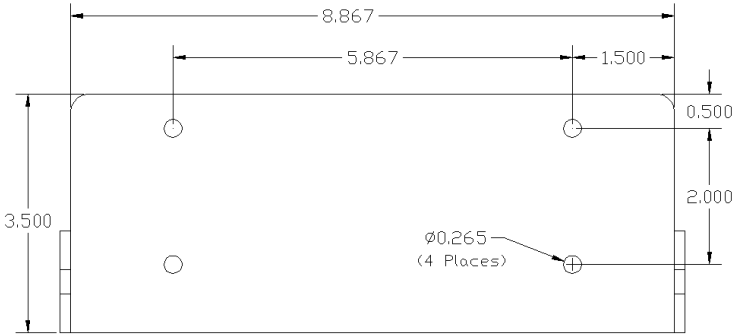
1. Wall-mount power supply
2. RS-232 cable to the Control Module
3. User manual

SECTION 3: Installation

Location Considerations

Because the Weather Display employs an LCD screen, the viewing angle and glare caused by light reflections must be considered when choosing a location. Install the Weather Display at a height and angle most convenient for the user to see and operate the screen.

Desktop Chassis Base Installation



The Weather Display base has four holes for permanent installation on a desktop or any other flat surface at various tilt angles.

The base also has four mounting holes to secure it to other surfaces, including a wall.

To secure the base:

1. Remove the chassis from the base by removing both side knobs. **Do not discard** the white shoulder washers.
2. Mark the location of the screw holes on the mounting surface.
3. Drill four holes using the appropriate size drill bit based on the size of screws being used.
4. Secure the mounting base using four screws.
5. Reattach the chassis using the two side knobs. Make sure the shoulder washers are in place.

Angle Adjustment

To adjust the angle of the desktop chassis:

1. Loosen only one knob while holding the chassis with the other hand (otherwise the chassis might drop).
2. Loosen the second knob while holding the chassis with the other hand.
3. Change the angle of the chassis.
4. Tighten both knobs.

Power Connection

The Weather Display is shipped with the following power supply:

Input: 100V to 240V AC, 50/60 Hz, 0.6 Amp
Output: 12V DC, 1.25 Amp

Ethernet Connection

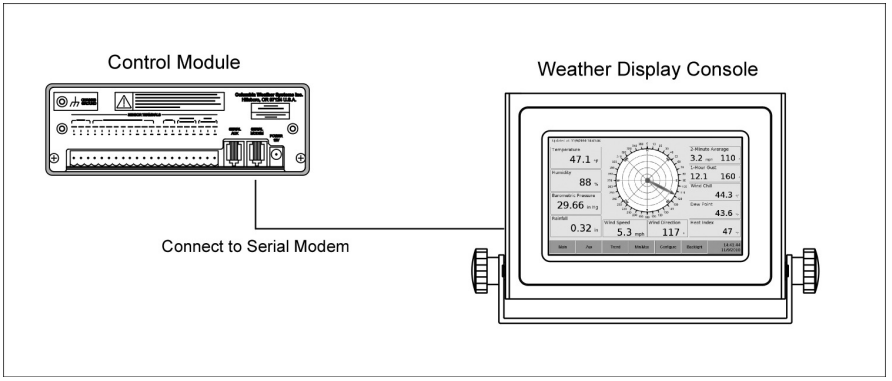
The Weather Display is shipped with a standard 7-foot Ethernet cable for network connection.

RS-232 Connection

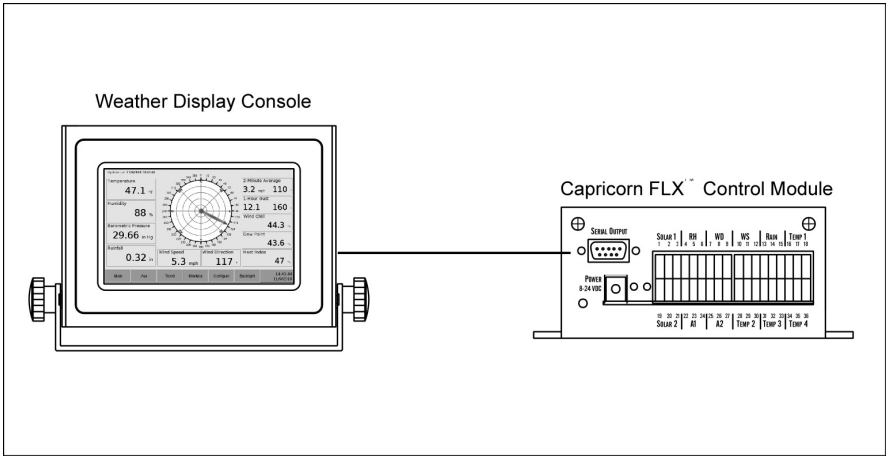
The Weather Display is shipped with a standard 7-foot RS-232 cable. This cable can be factory configured with additional length and has two RJ-11 connectors.

The RS-232 range also can be extended by using RS-485 converters or wireless transceivers, eliminating the cable between the Weather Display and the weather station.

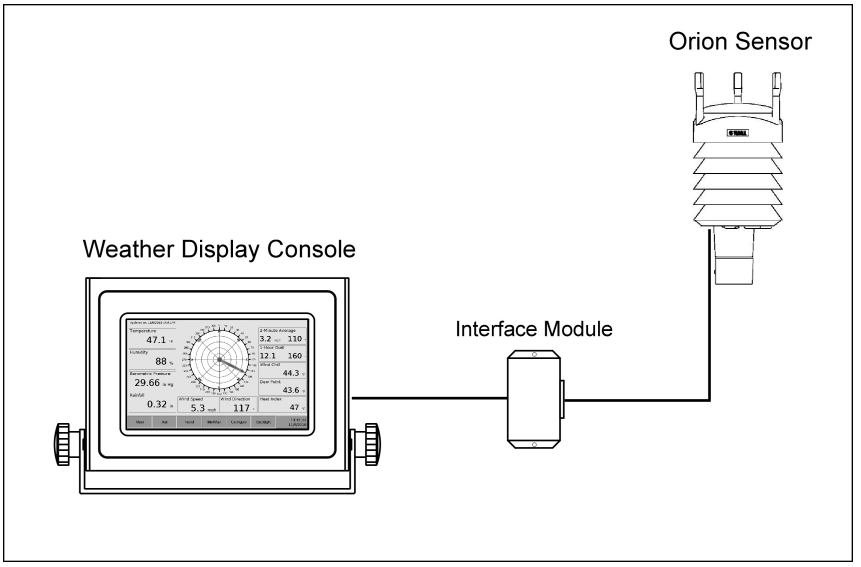
Capricorn 2000/2000EX, Direct RS-232 Connection



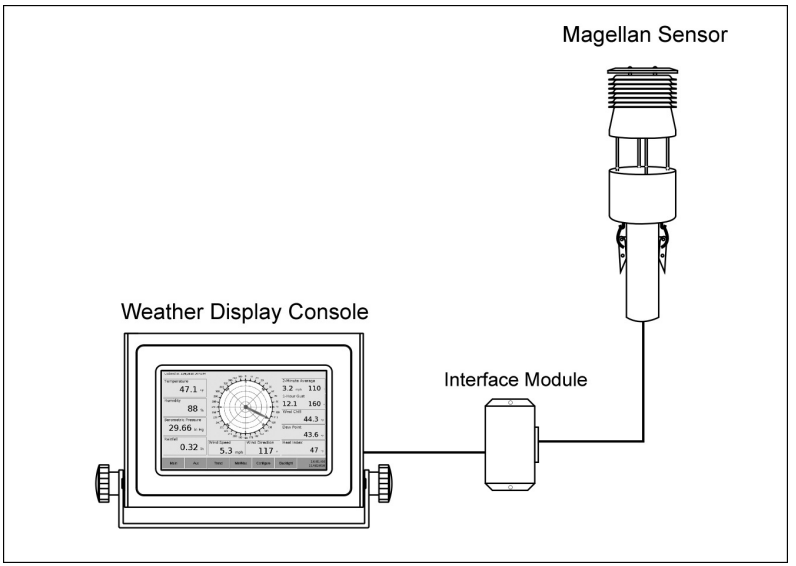
Capricorn FLX, Direct RS-232 Connection



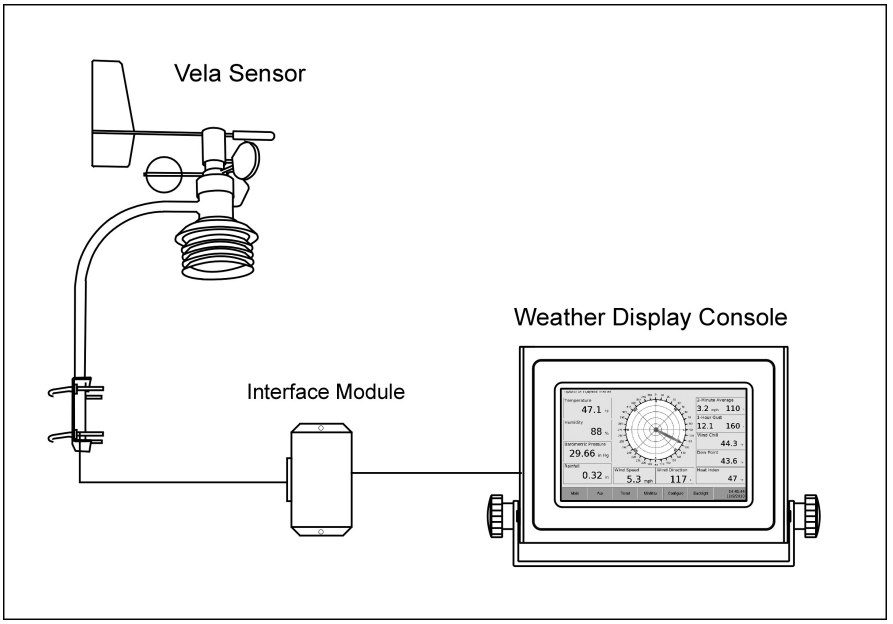
Orion Weather Station, Direct RS-232 Connection



Magellan Weather Station, Direct RS-232 Connection

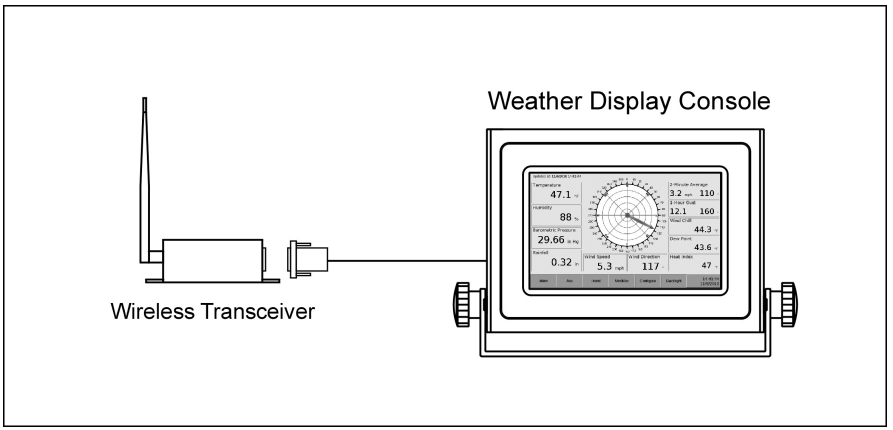


Vela Weather Station, Direct RS-232 Connection

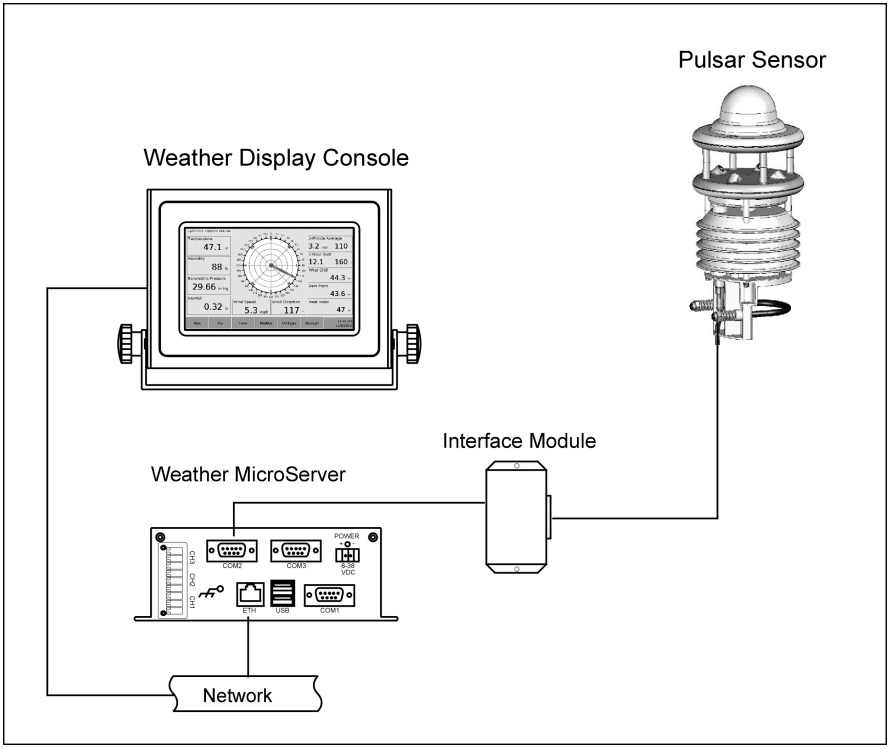


Wireless Weather Stations

For all wireless and portable Orion, Capricorn/Pegasus, Capricorn FLX, Vela and Magellan weather stations.



Pulsar Weather Station, Ethernet Connection



SECTION 4: Operation

The Weather Display console is capable of communicating over Serial RS-232 and Ethernet TCP/IP.

The Weather Display communicates directly with the weather station via a serial RS-232 connection or through the MicroServer via an Ethernet connection.

RS-232 Interface

Connect the Weather Display to the weather station using the RS-232 cable, RS-422 cable/converter, or the wireless transceivers.

The weather station should be installed with all the sensors connected and power applied. Please refer to the Weather Station user manual for more information about installation.

Apply power to the Weather Display. Be sure to use the power supply provided with the unit.

The Weather Display will boot up and load the Main monitoring screen.

First time power up:

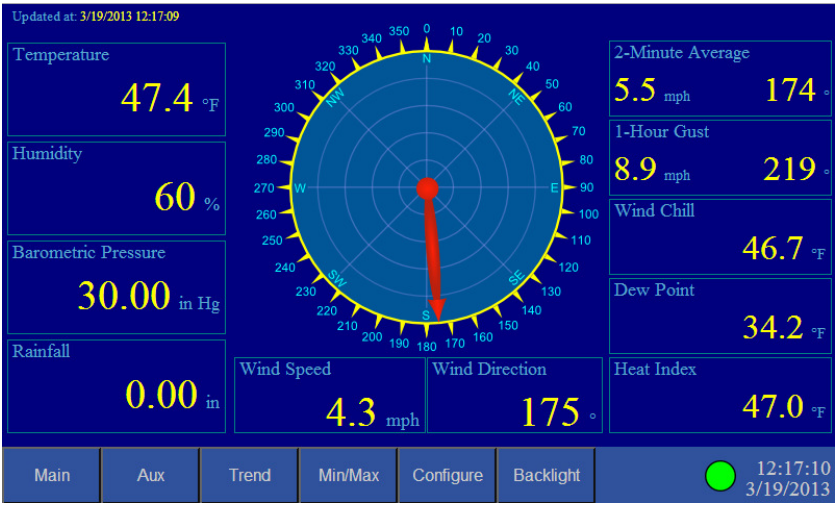
1. The screen will not display any measurements until it receives the first transmission from the weather station. This process can take up to 25 seconds.
2. In the Configure screen select Date/Time. Using the up and down arrow buttons, change the date and time to match your local settings.
3. In the Configure/Units screen select the desired units.

Ethernet Interface

1. Connect the Weather Display to the network.
2. In the Configure screen, enter the IP address of the MicroServer. Apply changes when done.
3. In the Configure/Network screen change the network settings (if needed) to match your network configuration. The IP address for the Weather Display must be unique. Apply changes when done.
4. The Weather Display will start displaying the weather data from the MicroServer.

5. In the Configure screen select Date/Time. Using the up and down arrow buttons, change the date and time to match your local settings. Apply changes when done.
6. In the Configure/Units screen select the desired units. Apply changes when done.

Main Screen



Updated Date and Time

Are displayed in the upper left side of the Main screen and all other data screens.

This is the date and time of the last received data set.

Alarm Indicator

The green dot indicates that an alarm can be enabled for the weather station. For more information see the Alarms section.

Temperature

Displays the temperature reading from the main temperature probe connected to the weather station. The value can be displayed in degrees Fahrenheit or Celsius.

The temperature reading is updated every 15 seconds in the Orion, Capricorn, and Pegasus weather stations, every 10 seconds in the Capricorn FLX and every second in the Magellan and Vela weather stations.

Please note that the air temperature reading is accurate only when the temperature probe is located in the shade. This can be done by placing the probe at the north facing side of a building or by using an aspirating radiation shield.

Relative Humidity/Dew Point

Displays the relative humidity in percentage.

The relative humidity reading is updated every 15 seconds in the Orion, Capricorn, and Pegasus weather stations, every 10 seconds in the Capricorn FLX and every second in the Magellan and Vela weather stations.

Barometric Pressure

Displays the barometric pressure reading. The value can be displayed in Inches of Mercury (in. Hg.), Millibars (mbar), Kilopascals (kpa), or Hectopascals (hpa).

The barometric pressure reading is updated every 15 seconds in the Orion, Capricorn, and Pegasus weather stations every 10 seconds in the Capricorn FLX and every second in the Magellan and Vela weather stations.

The barometric pressure reading is affected by the pressure offset and elevation settings in the Configure Screen, based on the QNH formula used by the FAA.

Rainfall

Displays the rainfall reading for the day. The value can be displayed in inches or millimeters.

The rainfall reading is reset to zero at midnight.

The rain for the day is updated every time a 0.01 inches accumulation is received. 0.0004 inches in the Pulsar 600.

Wind Speed

Displays wind speed reading. The value can be displayed in Miles per Hour (mph), Kilometers per Hour (kph), Knots or Meters per Seconds (m/s).

The wind speed is updated every second.

Wind Direction

Displays the wind direction reading graphically on a compass rosette and in degrees.

The wind direction is updated every second.

2-Minute Wind Average

Displays the 2-minute wind speed and direction averages.

The 2-minute wind average is updated every second.

1-Hour Wind Gust

Displays the 1-hour wind speed gust and the wind direction at gust.

The 1-hour wind gust is updated every second.

Wind Chill

Displays the wind chill temperature derived from the temperature and the wind speed sensors. The value can be displayed in degrees Fahrenheit or Celsius.

Note: *Wind chill temperature is only defined for temperatures at or below 50 degrees Fahrenheit and wind speeds above 3 mph.*

The wind chill reading is updated every 15 seconds.

Dew Point

Displays dew point temperature derived from the temperature and the relative humidity sensors. The value can be displayed in degrees Fahrenheit or Celsius.

The dew point reading is updated every 15 seconds.

Heat Index

Displays the heat index temperature derived from the temperature and the relative humidity sensors. The value can be displayed in degrees Fahrenheit or Celsius.

Heat Index temperature equals real air temperature when real air temperature is less than 70°F.

The heat index reading is updated every 15 seconds.

Auxiliary Screen

Temperature 1

Displays the temperature reading from the main temperature probe. The value can be displayed in degrees Fahrenheit or Celsius.

The temperature reading is updated every 15 seconds in the Orion, Capricorn, and Pegasus weather stations, every 10 seconds in the Capricorn FLX and every second in the Magellan and Vela weather stations.

Temperature 2 through 4

(Only available with the Capricorn/Pegasus, Capricorn FLX and MicroServer stations.)

Displays the temperature reading from the second, third and fourth temperature probes connected to the Capricorn/Pegasus or the MicroServer (with 8-Channel Analog Board). The values can be displayed in degrees Fahrenheit or Celsius.

The temperature reading is updated every 15 seconds.

These temperature sensor channels can be used for indoor air, soil, solar panel (cell), or outdoor air temperatures at various elevations.

Rain Today

Displays the rainfall reading for the day. The value can be displayed in inches or millimeters.

The rainfall reading is reset to zero at midnight.

The rain for the day reading is updated every 0.01 inch of rain accumulation. 0.0004 inches for the Pulsar 600.

Rain this Week

Displays the rainfall accumulation for the week. This reading is reset to zero at the beginning of the week (Sunday). This value can be displayed in inches or millimeters.

Rain for the week is updated every 0.01 inch of rain accumulation. 0.0004 inches for the Pulsar 600.

Rain this Month

Displays the rainfall accumulation for the month. This reading is reset to zero at the beginning of the month. This value can be displayed in inches or millimeters and is reset at the beginning of each month.

Rain for the month is updated every 0.01 inch of rain accumulation. 0.0004 inches for the Pulsar 600.

Rain this Year

Displays the rainfall accumulation for the year. This reading is reset to zero at the beginning of the year (00:00 January 1).

Rain for the year is displayed in inches or millimeters to the nearest tenth of an inch.

Rain for the year is updated every 0.1 inch of rain accumulation. 0.0004 inches for the Pulsar 600.

Rainfall Rate

Displays the rainfall rate based on the rainfall for the last 5 minutes. This value can be displayed in inches per hour or millimeter per hour.

The rainfall rate is updated every 15 seconds.

Density Altitude

Displays the density altitude. The value can be displayed in feet or meters.

The density altitude calculation is based on temperature, relative humidity, barometric pressure and elevation.

Density altitude reading is updated every 15 seconds.

Solar Radiation

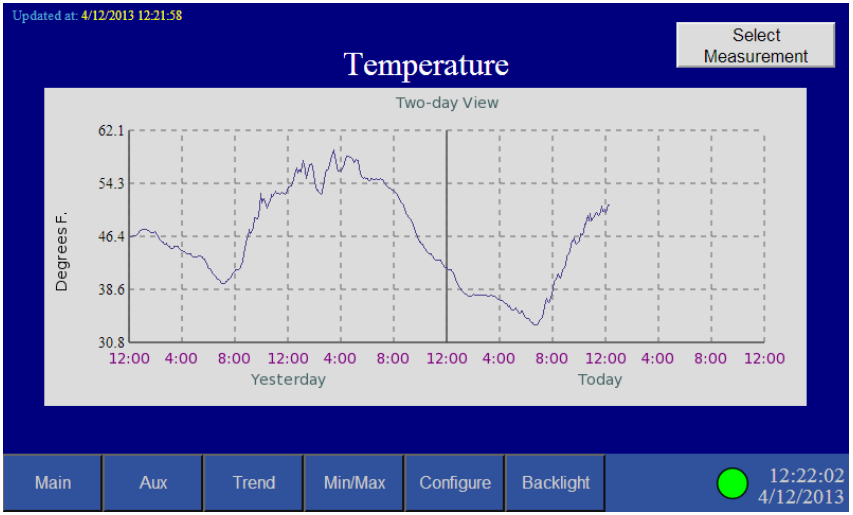
Displays the solar radiation. The value is displayed in watts/meter^2.

In Capricorn and Pegasus weather stations, the value is updated every 15 seconds. In Capricorn FLX weather stations, the value is updated every 10 seconds. Orion and Magellan weather stations update every 30 seconds. Pulsar weather stations update every 14 seconds.

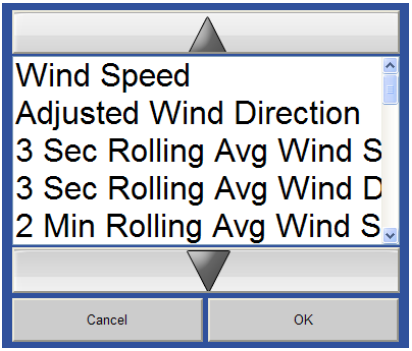
Visibility

Displays the visibility reading in miles or meters. Visibility reading updates every 30 seconds.

Trend Screen



To display the trend of a parameter, select the desired parameter by touching the Select Measurement button.

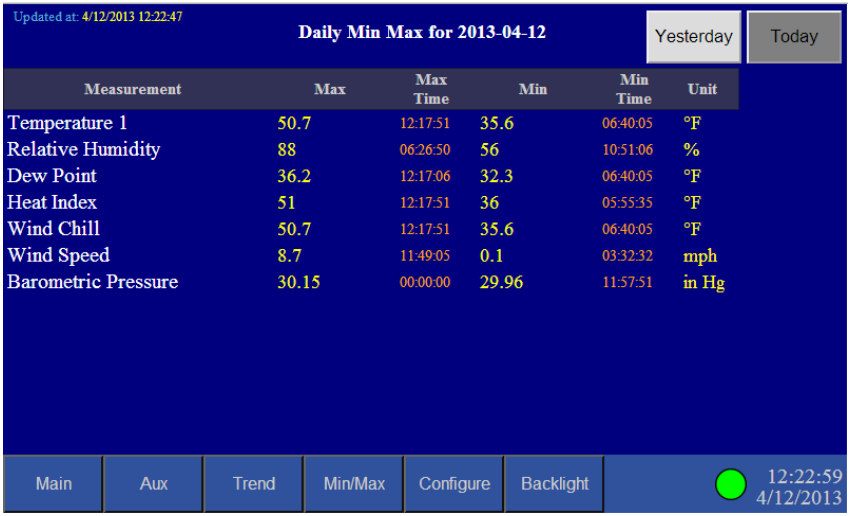


Use the up and down arrows to scroll through the list and touch the OK button to select the measurement.

Cancel will close the dialog without any selection.

The trend graph displays the data for yesterday and today.

Min/Max Screen

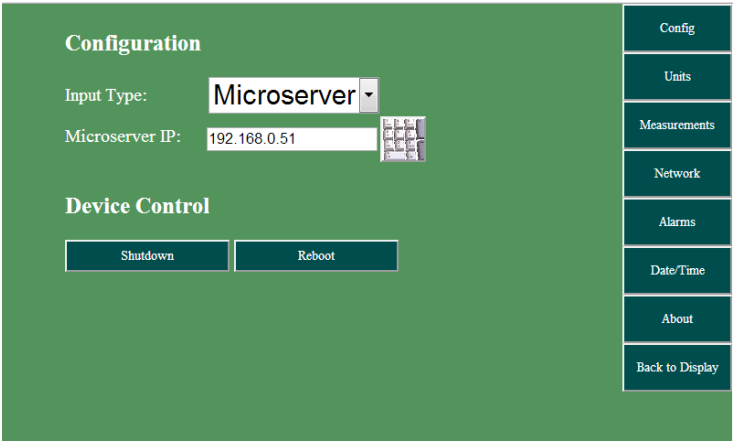


The Min/Max screen displays the daily minimum and maximum values and time of occurrence for the main parameters.

Touch the Yesterday button to display the minimum and maximum values for yesterday.

The values are displayed in the units defined in the Units screen.

Configuration Screen



To view this screen, touch the Configure button from any of the data screens (Main, Aux, Trend, and Min/Max) or the Config button from the subset configuration screens. This screen and the associated subset screens allow a variety of configuration options.

Select the Input Type.

For a serial connection, select the type of weather station, Orion, Capricorn, Capricorn FLX, Magellan or Vela.

For an Ethernet connection, select MicroServer and enter the IP address of the MicroServer. Touch the numerical entry pad icon to enter or edit the IP address.

Apply changes when done.

Shutdown

To shut down the Weather Display console, touch the Shutdown button and wait until the screen prompts you before disconnecting power.

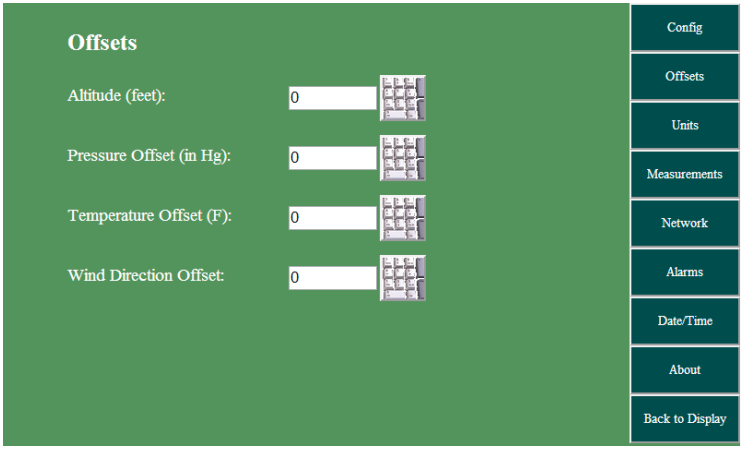
The console should not be powered off without initiating a shutdown.

Reboot

To reboot the Weather Display console, touch the Reboot button.

Offsets

Note: This screen is only available for RS-232 serial connections.



Enter an altitude offset in feet to adjust the barometric pressure reading to sea level.

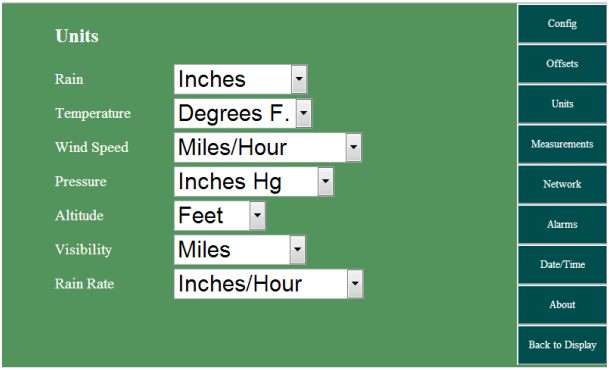
Enter a pressure offset in inches Hg to adjust the barometric pressure calibration.

Enter a temperature offset in °F to adjust the temperature calibration.

Enter a wind direction offset to adjust the wind direction calibration.

When done, touch Apply Changes for the offsets to take effect.

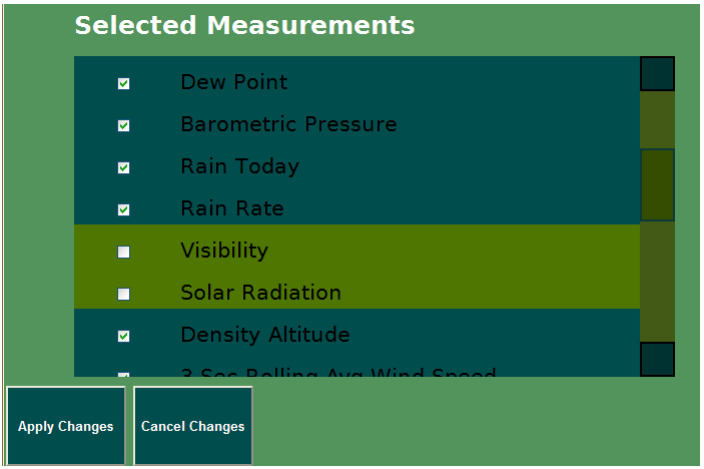
Units



The parameter units can be changed per user requirements.

Unit change applies to all the data screens.

Measurements

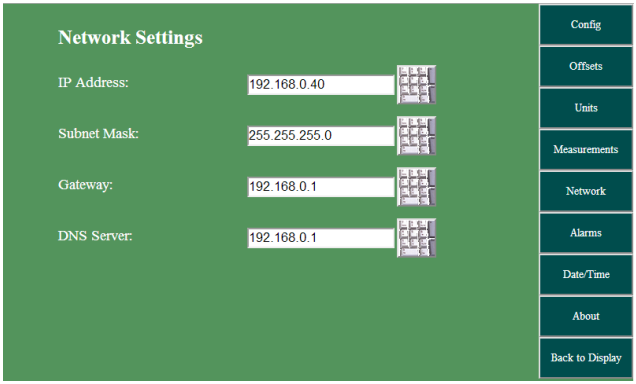


The Weather Display console is configured at the factory to match the weather station configuration.

To change the selected parameters, check or uncheck the desired parameter and apply changes when done.

Unselected parameters will not show any readings in the Main and Aux screens and will not be listed in the Trend screen measurement list.

Network



The Weather Display console is configured at the factory with the following default network settings:

IP Address: 192.168.0.40

Subnet Mask: 255.255.255.0

Gateway: 192.168.0.1

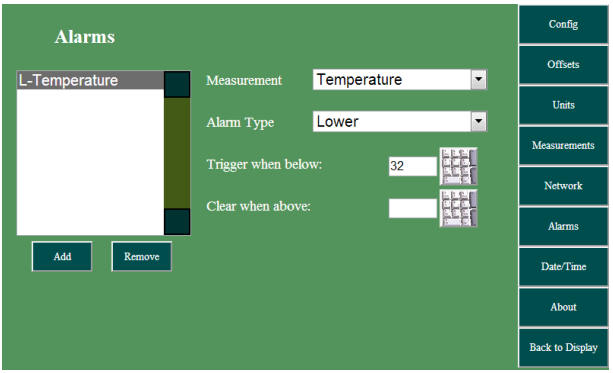
DNS Server: 192.168.0.1

To change the network setting, touch Network and use the keypad icon to edit the settings.

Apply changes when done.

The Weather Display can also be browsed using any Internet browser for configuration over the local network.

Alarms



An alarm feature can be enabled for all measurements listed on the Measurements screen.

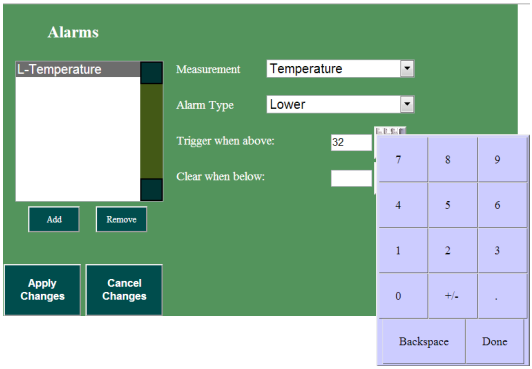
Please note: Only one alarm per measurement can be enabled.

To enable an alarm please follow the procedure below:

1. Press the Add button and choose a measurement from the Measurement drop down menu.

2. In the Alarm Type drop down menu determine whether the alarm will activate when parameters are above (Upper) or below (Lower) a set value.

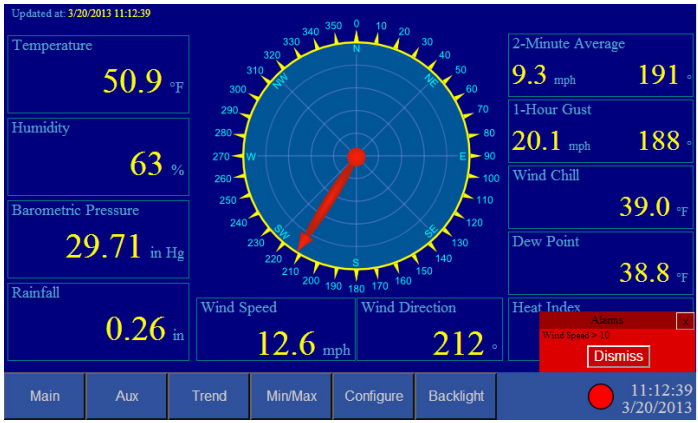
3. Press the keypad image to choose the appropriate value to Trigger the alarm, then press Done.



4. Press the keyboard image to choose the appropriate value to Clear the alarm, then press Done.

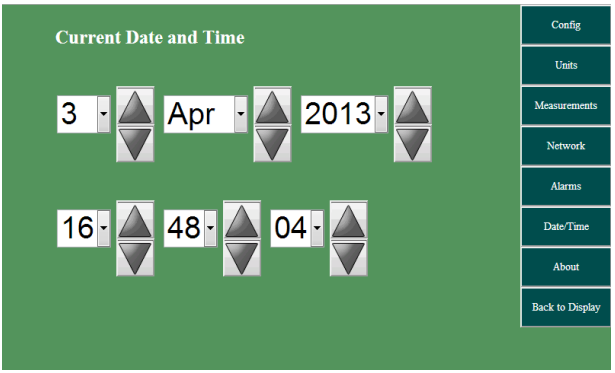
5. Press Apply Changes to save the alarm.

When an alarm is triggered, the green dot on the Main display screen will change to red and a tone will sound. A message will be displayed indicating a parameter has been surpassed. To clear the alarm message on the screen and tone press the Dismiss button.



To remove an alarm select the unwanted measurement on the Alarms screen, press the Remove button and then press Apply Changes.

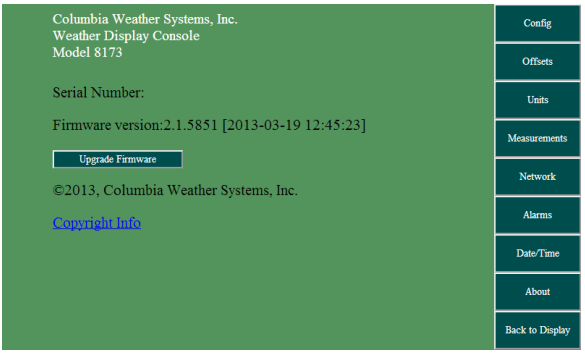
Date/Time



To change the date and time, use the up and down arrow buttons.

Press Apply Changes when done.

About



The About screen displays the model number, serial number and firmware version.

Firmware Upgrade

Upgrading the Weather Display Console
Upgrading the Weather Display Console is done by using a USB flash drive. The upgrade procedure may take up to 7 minutes. Please do not remove power during this time.
Upgrade Instructions
1. Please insert the USB flash drive into the top USB slot. (See illustration)
2. When ready, click the Begin Upgrade button.
Begin Upgrade
Cancel
Config
Offsets
Units
Measurements
Network
Alarms
Date/Time
About
Back to Display

The firmware screen can be reached by pressing the Upgrade Firmware button on the About screen.

To complete a firmware upgrade a firmware file is needed, which can be obtained by contacting Columbia Weather Systems.

To request an upgrade please send an email to support@columbiaweather.com

Backlight

To preserve the life of the backlight, turn it off by touching the Backlight button. The Weather Display will still be fully operational.

To restore the backlight, touch any part of the screen.

SECTION 5: Maintenance

The Weather Display requires no maintenance other than cleaning the chassis and the LCD touch screen.

To clean the LCD touch screen, turn the unit off, wipe the screen with an LCD screen cleaner.

SECTION 6: Troubleshooting

Communication

If the Weather Display is not displaying current weather data from the weather station or the MicroServer, check the following:

1. Make sure the input type (weather station type) is set correctly in the Configure screen.
2. Verify that measurements are selected in the Measurements screen.
3. Verify that the IP address of the MicroServer has been entered in correctly in the Configuration screen.
4. Login to the MicroServer and verify that it is receiving data by viewing the Latest Measurements page.
5. If the Orion, Magellan, Vela or Pulsar sensor is part of the weather station locate the Interface Module. The green power LED should be solid and the red signal LED should be blinking once every second. For Capricorn 2000EX or Capricorn FLX stations, the Control Module power LED should be on.
6. Check the RS-232 cable between the Weather Display and the weather station for proper connection and configuration. Use the original cable supplied with the console.

SECTION: 7 User Support Information

This section consists of the following items:

1. Two-Year Limited Warranty: Please read this document carefully.
2. Return for Repair Procedure: This procedure is for your convenience in the event you must return your Weather Display for repair or replacement. Follow the packing instructions carefully to protect your instrument in transit.

Limited Warranty

Columbia Weather Systems, Inc. (CWS), warrants the Weather Display to be free from defects in materials and/or workmanship when operated in accordance with the manufacturer's operating instructions, for two (2) years from date of purchase, subject to the provisions contained herein. CWS warranty shall extend to the original purchaser only and shall be limited to factory repair or replacement of defective parts.

Exclusions

Certain parts are not manufactured by CWS (i.e., certain purchased options, etc.) and are therefore not covered by this warranty. These parts may be covered by warranties issued by their respective manufacturers and although CWS will not warrant these parts, CWS will act as agent for the administration of any such independent warranties during the term of this warranty. This warranty does not cover normal maintenance, damage resulting from improper use or repair, or abuse by the operator. Damage caused by lightning or other electrical discharge is specifically excluded. This warranty extends only to repair or replacement, and shall in no event extend to consequential damages. In the event of operator repair or replacement, this warranty shall cover neither the advisability of the repair undertaken, nor the sufficiency of the repair itself.

THIS DOCUMENT REFLECTS THE ENTIRE AND EXCLUSIVE UNDERSTANDING OF THE PARTIES, AND EXCEPT AS OTHERWISE PROVIDED HEREIN, ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, PARTICULARLY THE WARRANTIES OF MERCHANT ABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE ARE EXCLUDED.

This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.

Return for Repair Procedure

1. In the event of defects or damage to your unit, first call the factory Monday through Friday, 8:30 AM to 4:00 PM PST, (503) 629-0887 to determine the advisability of factory repair. The Service Department will issue an RMA number (Return Merchandise Authorization) to help us identify the package when received. Please place that number on the outside of the box.

2. In the event factory service is required, return your as follows:

   A. Packing

   - Wrap the Weather Display in a plastic bag first.
   - Pack in original shipping carton or a sturdy oversized carton.
   - Use plenty of packing material.

   B. Include:

   - A brief description of the problem with all known symptoms.
   - Your phone number.
   - Your return street shipping address (UPS will not deliver to a P.O. box.)
   - Write the RMA number on the outside of the box.

   C. Shipping

   - Send freight prepaid. (UPS recommended.)
   - Insurance is recommended. (The factory can provide the current replacement value of the item being shipped for insurance purposes.)

   D. Send to:

   Columbia Weather Systems, Inc.

   5285 NE Elam Young Parkway, Suite C100

   Hillsboro, Oregon 97124

   E. C.O.D. shipments will not be accepted.

3. If your unit is under warranty, after repair or replacement has been completed, it will be returned by a carrier and method chosen by Columbia Weather, Inc. to any destination within the continental U.S.A. If you desire some other specific form of conveyance or if you are located beyond these borders, then you must bear the additional cost of return shipment.

4. If your unit is not under warranty, we will call you with an estimate of the charges. If approved, your repaired unit will be returned after all charges, including parts, labor and return shipping and handling, have been paid. If not approved, your unit will be returned as is via UPS COD for the amount of the UPS COD freight charges.

Reference

Glossary

Aspirating Radiation Shield

A device used to shield a sensor such as a temperature probe from direct and indirect radiation and rain while providing access for ventilation.

Barometric Pressure

The pressure exerted by the atmosphere as a consequence of gravitational attraction exerted upon the “column” of air lying directly above the point in question.

Celsius Temperature Scale

A temperature scale with the ice point at 0 degrees and the boiling point of water at 100 degrees.

Dew Point

The temperature to which a given parcel of air must be cooled at constant pressure and constant water-vapor content in order for saturation to occur. When this temperature is below 0°C, it is sometimes called the frost point.

Density Altitude

Density altitude is a meteorological variable that is important to pilots, especially during the summer. The density altitude is the altitude in a standard atmosphere where the density is the same as the given atmospheric density. During a hot muggy summer day, a pilot begins take off from an airport with an elevation of 2500 feet. Because of the warm temperature and the moisture in the air, the airplane has to work as if it was taking off at an airport at an elevation of 6000 feet resulting in the plane needing more power and a longer roll down the runway to take off.

Fahrenheit Temperature Scale

A temperature scale with the ice point at 32 degrees and the boiling point of water at 212 degrees.

Global Radiation

The total of direct solar radiation and diffused sky radiation received by a unit horizontal surface. Global radiation is measured by a pyranometer.

Heat Index

The heat index or apparent temperature is a measure of discomfort due to the combination of heat and high humidity. It was developed in 1979 and is based on studies of evaporative skin cooling for combinations of temperature and humidity.

Pyranometer

It measures the combined intensity of incoming direct solar radiation and diffused sky radiation. The pyranometer consists of a radiation-sensing element, which is mounted so that it views the entire sky.

Relative Humidity

Popularly called humidity. The ratio of the actual vapor pressure of the air to the saturation vapor pressure.

Sea Level Pressure

The atmospheric pressure at mean sea level, either directly measured or, most commonly, empirically determined from the observed station pressure.

In regions where the earth's surface pressure is above sea level, it is standard observational practice to reduce the observed surface pressure to the value that would exist at a point at sea level directly below.

Solar Radiation

The total electromagnetic radiation emitted by the sun. 99% of the sun's energy output falls within the wavelength interval from 0.15 microns to 4.0 microns, with peak intensity near 0.47 microns. About one-half of the total energy in the solar beam is contained within the visible spectrum from 0.4 to 0.7 microns, and most of the other half lies near infrared, a small additional portion lying in the ultraviolet.

Wind Chill

That part of the total cooling of a body caused by air motion.

Unit Conversion

Speed

Kilometers per hour = 1.610 x miles per hour

Knots = 0.869 x miles per hour

Meters per second = 0.448 x miles per hour

Feet per second = 1.467 x miles per hour

Temperature

Temperature in °C = 5/9 (temperature in °F - 32)

Temperature in °F = (1.8 x temperature in °C) + 32

Distance

Millimeters = 25.4 x inches

Pressure

Millibars = 33.86 x inches of mercury

Kilopascals = 3.386 x inches of mercury

Pounds per square inch = 0.49 x inches of mercury

Standard atmospheres = 0.0334 x inches of mercury

Solar Radiation

BTU/foot^2 minutes = 0.00529 x watts/meter^2

Joules/centimeter^2 minutes = 0.006 x watts/meter^2

Mega joules/meter^2 day = 11.574 x watts/meter^2

Langleys/minutes = 0.00143 x watts/meter^2

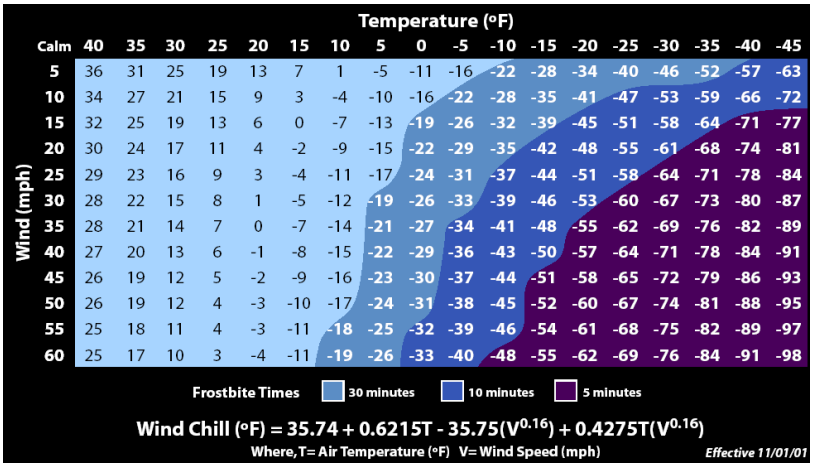
Tables and Formulas

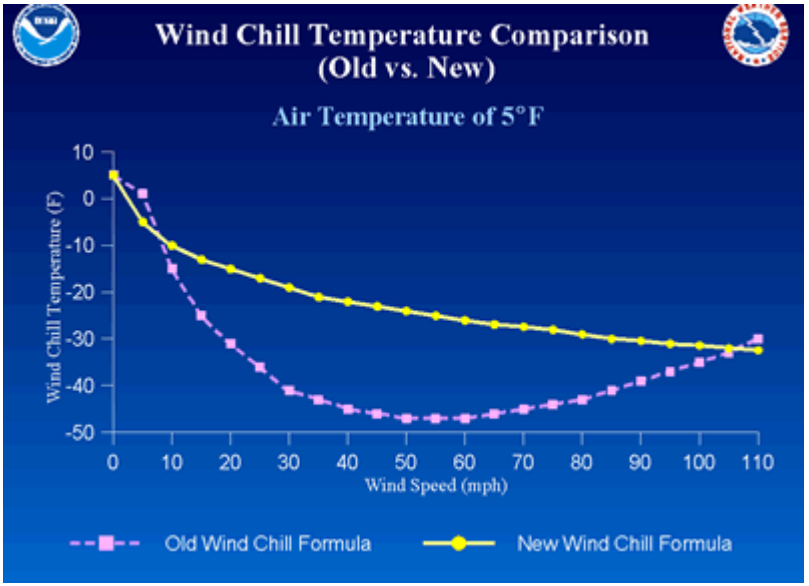
Wind Chill Chart

In 2001, NWS implemented an updated Wind chill Temperature (WCT) index. The change improves upon the former WCT Index used by the NWS and the Meteorological Services of Canada, which was based on the 1945 Siple and Passel Index.

In the fall of 2000, the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) formed a group consisting of several Federal agencies, MSC, the academic community (Indiana University-Purdue University in Indianapolis (IUPUI), University of Delaware and University of Missouri), and the International Society of Biometeorology to evaluate and improve the windchill formula. The group, chaired by the NWS, is called the Joint Action Group for temperature Indices (JAG/TI). JAG/TI's goal is to upgrade and standardize the index for temperature extremes internationally (e.g. Wind chill Index).

The current formula uses advances in science, technology, and computer modeling to provide a more accurate, understandable, and useful formula for calculating the dangers from winter winds and freezing temperatures.





Wind Chill Equation

$WC = 35.74 + 0.6215\ T - 35.75(V^{0.16}) + 0.4275\ T(V^{0.16})$

Where:

WC = wind chill temperature in °F

V = wind velocity in mph

T = air temperature in °F

Note: Wind chill Temperature is only defined for temperatures at or below 50 degrees F and wind speeds above 3 mph.

Heat Index

	Temperature in °F													
RH	70	75	80	85	90	95	100	105	110	115	120	125	130	135
0	64	66	73	78	83	87	91	95	99	103	107	111	117	120
5	64	69	74	79	84	88	93	97	102	107	111	116	122	126
10	65	70	75	80	85	90	95	100	105	111	116	123	131	
15	65	71	76	81	86	91	97	102	108	115	123	131		
20	66	72	77	82	87	93	99	105	112	120	130	141		
25	66	72	77	83	88	94	101	109	117	127	139			
30	67	73	78	84	90	96	104	113	123	135	148			
35	67	73	79	85	91	98	107	118	130	143				
40	68	74	79	86	93	101	110	123	137	151				
45	68	74	80	87	95	104	115	129	143					
50	69	75	81	88	96	107	120	135	150					
55	69	75	81	89	98	110	126	142						
60	70	76	82	90	100	114	132	149						
65	70	76	83	91	102	119	138							
70	70	77	84	93	106	124	144							
75	70	77	85	95	109	130	150							
80	71	78	86	97	113	136								
85	71	78	87	99	117	140								
90	71	79	88	102	122	150								
95	71	79	89	105	126									
100	72	80	90	108	131									

Dew Point

B = (ln (RH/100) + ((17.2694*T) / (238.3+T))) / 17.2694

Dew Point in ℃ = (238.3 * B) / (1-B)

Where:

RH = Relative Humidity

T = Temperature in ℃

Ln = Natural logarithm

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